In the Claims:

1. (Currently Amended) A microchannel Cross load array, comprising:

a cathode,

an anode,

an array of at least two rows of sample wells arranged adjacent to but not overlapping said anode,

an array of waste wells arranged along a common row and intermediate said at least two rows of sample wells and said cathode, and ~~said sample wells comprising twice the number of waste wells,~~

~~an anode, and~~

an array of functionally identical channels, each channel having an injection point connected directly to only one well of said array of sample wells, connected directly to only one well of said array of waste wells, connected directly to said cathode and connected directly to said anode.

2. (Previously amended) The microchannel Cross load array of Claim 1, which said cathode and said anode each define common slots.

3. (Previously amended) The microchannel Cross load array of Claim 1, wherein said sample wells are selected from the group consisting of wells having substantially circular holes, wells having substantially tapered holes, and wells having holes.

4. (Original) The microchannel Cross load array of Claim 1, wherein said waste wells define substantially circular holes.

5. (Original) The microchannel Cross load array of Claim 1, wherein both said sample and waste wells define substantially circular holes.

6. (Original) The microchannel Cross load array of Claim 1, wherein said sample wells define substantially square holes.

7. (Original) The microchannel Cross load array of Claim 1, wherein said waste wells define substantially square holes.

8. (Original) The microchannel Cross load array of Claim 1, wherein both said sample and waste wells define substantially square holes.

9. (Original) The microchannel Cross load array of Claim 1, wherein both said sample and waste wells are formed on a biaxial, collinear grid by EDM machining or other machining process producing orthogonal rows and columns.

10. (Original) The microchannel Cross load array of Claim 1, wherein said channels are identical in shape.

11. (Original) The microchannel Cross load array of Claim 1, wherein said array of channels form flow paths for each channel which are identical in shape, using multiple mirror image pieces.

12. (Original) The microchannel cross load array of Claim 1, wherein said array of channels form equal or unequal flow paths from said injection point to said cathode and from said injection point to said waste wells.

13. (Previously amended) The microchannel Cross load array of Claim 1, wherein said array of channels form symmetric flow paths from said injection point to said cathode and to said waste wells.

14. (Original) The microchannel Cross load array of Claim 13, wherein said symmetric flow paths are of the same lengths.

15. (Original) The microchannel Cross load array of Claim 1, wherein said array of sample wells are located in a plurality of rows.

16. (Original) The microchannel Cross load array of Claim 15, wherein adjacent channels which are located adjacent said anode have a pitch, Pch, wherein adjacent sample wells in each row have as pitch, Ps, and wherein Ps equals 2Pch.

17. (Original) The microchannel Cross load array of Claim 16, wherein the pitch, Pch, is about 0.5-4.5 mm.

18. (Original) The microchannel Cross load array of Claim 15, wherein each row of sample wells has a common bias.

19. (Original) The microchannel Cross load array of Claim 1, wherein said array of waste wells are located in a row, and have a common bias.

20. (Previously Amended) An architecture for microchannel arrays using T or Cross loading for injection and separation chemistry applications performed in microfluidic configurations,

said architecture producing a dense layout of functionally identical shaped microchannels, sample wells, and waste wells, and including a common cathode and a common anode,

said microchannels each having an injection point interconnecting a sample well, a waste well, a cathode and an anode,

said microchannels each defining equal length flow paths between said injection point and said waste well, and between said injection point and said cathode.

21. (Original) The architecture for microchannel arrays of Claim 20, wherein said flow paths are symmetric.

22. (Original) The architecture for microchannel arrays of Claim 20, wherein said sample wells are located in a plurality of rows, and wherein said waste wells are located in a single row.

23. (Original) The architecture for microchannel arrays of Claim 20, wherein said microchannels each include flow paths from said injection point to a sample well and from said injection point to said anode.

24. (Original) The architecture for microchannel arrays of Claim 23, wherein adjacent flow paths of said channels located adjacent said anode have a channel pitch, Pch, wherein adjacent sample wells have a sample pitch, Ps, and wherein Ps= 2Pch.

25. (Original) The architecture for microchannel arrays of Claim 24, wherein the channel pitch, Pch, is about 0.5-4.5 mm.

26. (Original) The architecture for microchannel arrays of Claim 20, wherein said sample wells and said waste wells having a configuration selected from the group consisting of circular and square shapes with straight or tapered walls.

27. (Original) The architecture for microchannel arrays of Claim 20, wherein said common cathode and said common anode are each of a slot configuration.

28. (Previously amended) The architecture for microchannel arrays of Claim 20, wherein said sample wells are located in a plurality of rows, wherein said waste wells are located in a single row, and wherein each of said rows has a common bias.

29. (Previously Added) The microchannel Cross load array of Claim 1, wherein said array of functionally identical channels comprises at least one pair of functionally identical channels.

30. (Previously Added) The microchannel Cross load array of Claim 1, wherein said array of functionally identical channels comprises a purality of pairs of functionally identical channels.

31. (Previously amended) The microchannel Cross load array of Claim 30, wherein each of said plurality of pairs of functionally identical channel has a common waste well.

32. (Previously amended) A microchannel Cross load array, comprising:

a cathode,

an array of sample wells,

an array of waste wells, said sample wells comprising twice the number of waste wells,

an anode, and

an array of functionally identical channels, each channel having an injection point connected directly to only one well of said array of sample wells, connected directly to only one well of said array of waste wells, connected directly to said cathode and connected directly to said anode,

each of said functionally identical channels has the same length from said injection point to said sample well, from said injection point to said waste well, from said injection point to said cathode, and from said injection point to said anode.

33. (Previously Added) The microchannel Cross load array of Claim 31, wherein said common waste well is positioned in alignment with at least one sample well.

34. (Previously Added) The microchannel Cross load array of Claim 31, wherein said common waste well is located in an offset position relative to at least one sample well.

35. (Previously Added) The microchannel Cross load array of Claim 31, wherein said common waste well is located from the injection point at about one-half the distance from the injection point to the cathode.

36. (Previously Added) A microchannel Cross load array, comprising:

a cathode,

an array of sample wells,

an array of waste wells, said sample wells comprising twice the number of waste wells,

an anode, and

an array of functionally identical channels, each channel having an injection point connected directly to only one well of said array of sample wells, connected directly to only one well of said array of waste wells, connected directly to said cathode and connected directly to said anode,

said array of functionally identical channels comprises a plurality of pairs of functionally identical channels,

each of said plurality of pairs of functionally identical channels has a common waste well,

said common waste well being located from said injection point at about one-half the distance from said injection point to said cathode.

37. (Previously Added) The microchannel Cross load array of Claim 36, wherein said common waste well is positioned in alignment with at least one sample well.

38. (Previously Added) A microchannel Cross load array, comprising:

a cathode,

an array of sample wells,

an array of waste wells, said sample wells comprising twice the number of waste wells,

an anode, and

an array of functionally identical channels, each channel having an injection point connected directly to only one well of said array of sample wells, connected directly to only one well of said array of waste wells, connected directly to said cathode and connected directly to said anode,

said array of functionally identical channels comprises a plurality of pairs of functionally identical channels,

each of said plurality of pairs of functionally identical channels has a common waste well,

said common waste well being located from said injection point at about the same distance from said injection point to said cathode.

39. (Previously Added) The microchannel Cross load array of Claim 38, wherein said common waste well is located in an offset position relative to at least one sample well.

40. (Previously Added) The microchannel Cross load array of Claim 32, wherein said length from said injection point to said waste well is substantially the same as the length from said injection point to said cathode.

41. (Previously Added) A microchannel Cross load array, comprising:

a cathode,

an array of sample wells,

an array of waste wells, said sample wells comprising twice the number of waste wells,

an anode, and

an array of functionally identical channels, each channel having an injection point connected directly to only one well of said array of sample wells, connected directly to only one well of said array of waste wells, connected directly to said cathode and connected directly to said anode,

said array of channels form flow paths from said injection point to said cathode and to said waste wells which are of the same lengths.

42. (Previously Added) The microchannel Cross load array of Claim 41, wherein said array of sample wells are located in a plurality of rows.

43. (Previously Added) The microchannel Cross load array of Claim 42, wherein adjacent channels which are located adjacent said anode have a pitch, Pch, wherein adjacent sample wells in each row have a pitch, Ps, and wherein Ps equals 2 Pch.